AKZO NOBEL SALT INC.

UIC PERMIT REAPPLICATION
for
CLASS III SOLUTION MINING WELLS

WATKINS GLEN, NEW YORK

JANUARY, 1995

Form Approved. OMB No. 2040-0042. Expires 3-31-95

Form 4

EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
UNDERGROUND INJECTION CONTROL

I. EPA ID NUMBER

T/A | C

code 'x,' explain

D. Number of wells per type (if area permit)

20 Wells Class III Type G

VIII. CLASS AND TYPE OF WELL (see reverse)

A. Class(es) (enter code(s))	B. Type(s) (enter code(s))	C. If class is "other" or type is c
III	G	

PROJECT

Feet from	Line	Feet from	Line
500	S	16700	W

X. INDIAN LANDS (Mark 'x')

☐ Yes ☒ No

IX. LOCATION OF WELL(S) OR APPROXIMATE CENTER OF FIELD OR

C	A. Latitude			B. Longitude			Township and Range			
	Deg	Min	Sec	Deg	Min	Sec	Twsp	Range	Sec	¼ Sec
I	42	25		76	50					

XI. ATTACHMENTS

(Complete the following questions on a separate she

eet(s) and number accordingly; see instructions)

FOR CLASSES I, II, III (and other classes) complete ar

nd submit on separate sheet(s) Attachments A — U (pp 2-6) as

appropriate. Attach maps where required. List attac

chments by letter which are applicable and are included with

your application:

XII. CERTIFICATION

I certify under the penalty of law that I ha

ve personally examined and am familiar with the

information submitted in this document an

d all attachments and that, based on my inquiry of

those individuals immediately responsible

for obtaining the information, I believe that the

information is true, accurate, and complete

. I am aware that there are significant penalties for

submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

PERMIT APPLICATION

(Collected under the authority of the Safe Drinking Water Act. Sections 1421, 1422, 40 CFR 144)

U | NYD 002246361

READ ATTACHED INSTRUCTIONS BEFORE STARTING
FOR OFFICIAL USE ONLY

Received day year	Permit/Well Number	Comments

UIC

Application approved mo day year	Date mo

ADDRESS

t Inc.

d

State	ZIP Code
NY	14891

III. OWNER/OPERATOR AND ADDRESS

Owner/Operator Name
Akzo Nobel Salt Inc.

Street Address
Salt Point Road

City	State	ZIP Code
Watkins Glen	NY	14891

II. FACILITY NAME AND A

Facility Name
Akzo Nobel Sal

Street Address
Salt Point Roa

City
Watkins Glen

(Mark 'x')

tate ☒ C. Private

ther (Explain)

V. SIC CODES

2899

IV. OWNERSHIP STATUS

☐ A. Federal ☐ B. S

☐ D. Public ☐ E. O

'x')

e Started day year 1908

☐ B. Modification/Conversion ☐ C. Proposed

VI. WELL STATUS (Mark

☒ A. Operating

Date mo

QUESTED (Mark 'x' and specify if required)

Area	Number of Existing wells	Number of Proposed wells	Name(s) of field(s) or project(s)
	20	44	International Brinefield

VII. TYPE OF PERMIT REQ

☐ A. Individual ☒ B. A

A. Name and Title (Type or Print)	B. Phone No. (Area Code and No.)
Walter E. Fitzgerald Vice President Production	717/587-5131
C. Signature Walter E Fitzgerald	D. Date Signed Jan 26, 1995

EPA Form 7520-6 (2-84)

A Area of Review Method

The area of review includes all property owned in fee and all mineral rights held by Akzo Nobel Salt Inc. in the Watkins Glen refinery area, and all areas within a quarter-mile fixed radius of those properties, as prescribed by 40 CFR 146.6 (b)(2) for area permit applications. The area of review is shown in Drawing A-1.

Legend

- Fee Simple
- Mineral Rights
- Area Of Review

Akzo Nobel Salt Inc.
Watkins Glen, N.Y.
International Brine Field
And Area Of Review
January 16, 1995
Drawing A-1

F Geologic Structure of Area

F.1 Regional Geology

The Watkins Glen brinefield is located in the northeast corner of the Appalachian basin, a major structural feature of New York, Pennsylvania, Eastern Ohio, West Virginia, Lake Erie, and southwestern Ontario. The basin is bounded eastwardly by the Appalachian foldbelt and northwardly by the Canadian shield. The basin features extensive Paleozoic sedimentary deposition over a stable Precambrian basement. Climate and marine conditions in the middle Silurian period caused a significant evaporate sequence to be laid down, including the economically important Salina salt beds that now support a major salt extraction industry in the northeastern U. S.

The brinefield is located on the western shore of Seneca Lake, the largest of the Finger Lakes of New York. These long, very deep, trough-shaped valleys were gouged from older stream valleys by Pleistocene glaciers. The local result is a steep-sided valley wall featuring extensive bedrock outcrops and very little unconsolidated overburden outside of the valley floor and lake bottom.

The Watkins Glen area is classified as low to moderate seismic risk.

F.2 Local Geology

The local geology at the Watkins Glen brinefield is well defined by wireline logs and by cores recovered from the brine wells drilled in the past. A geologic column is shown in Figure F-1. All beds dip approximately 1ft/100ft to the south.

The basement Precambrian metamorphic and intrusive igneous rock lies at approximately 9200 feet below the surface.

The injection zone used in solution mining is the Syracuse salt formation, which consists of about 900 feet of interbedded halite, anhydrite, dolomite, gypsum, shale, and limestone of Silurian age. It is practically impermeable; injection can only be accomplished by allowing simultaneous brine production. Brine is produced for plant feedstock by injecting water or dilute brine to dissolve salt and create an open cavern or by hydraulic fracturing to create an open flowpath through the salt beds to a second well. The salt is divided into two main units, designated D and F, with F being the shallower. Salt is recovered from both beds.

Thrust faults have been mapped in the field by comparison of wireline logs and cores from the various brine wells. These generally appear to terminate at the base of the salt. Inspection of slip surfaces in cores show that these have healed, and do not provide a conduit for fluid movements. The history of hydraulic fracturing, described further in section J, confirms this conclusion, as fluid movement can be induced only by pumping at very high pressures, from 1.25 to 1.50 psi per foot of depth.

The Syracuse salt is overlain by hundreds of feet of confining beds, primarily tight Devonian shales. These beds provide effective, redundant confinement for injected and produced fluids. The immediate overlying formation is the Camillus, a 50-foot thick Silurian shale of low permeability.

F.3 Attachments

A drill cuttings and core description from solution mining well 58 is attached to show the typical lithology in the AOR.

Table F-1 shows a generalized geologic column for Watkins Glen.

Drawing F-1 shows the bedrock geology of the Finger Lakes region, along with type descriptions of the regional formations.

TABLE F-1
GENERALIZED GEOLOGIC CROSS SECTION
WATKINS GLEN NEW YORK

SYSTEM	GROUP	FORMATION	DESCRIPTION	APPROXIMATE FORMATION TOP
		Overburden	Boulders & Clay	0
Devonian	Portage	West River	Shale & Dolomite	10
	Genesee	Genesee	Shale	90
		Lodi Island	Limestone	580
	Hamilton	Tully	Limestone	460
		Hamilton	Shale	600
		Marcellus	Shale	1200
		Cherry Valley	Limestone	1225
		Marcellus	Shale	1250
	Onondaga	Onondaga	Limestone	1275
		Schoharie	Limestone	1300
	Oriskany	Oriskany	Sandstone	1340
Silurian	Salina	Manilus	Limestone	1350
		Rondout	Dolomite	1500
		Cobelskill	Limestone	1600
		Bertie	Dolomite	1650
		Camillus	Shale	1700
		Syracuse	Salt & Anhydrite	1750
		Vernon	Shale	2650
	Niagaran	Lockport	Dolomite	3500
		Rochester	Shale	3600
	Clinton	Clinton	Limestone	4100
	Medina	Albion	Sandstone	4200
		Red Medina	Sandstone	4300
		White Medina	Sandstone	4400
		Queenston	Shale	4500
		Oswego	Sandstone	5300
Ordovician		Frankfort	Shale	5600
		Hudson River	Sandstone	6400
		Utica	Shale	6500
		Trenton	Limestone & Dolomite	6700
		Tribes Hill	Limestone	7600
		Little Falls	Dolomite	7700
Cambrian		Potsdam	Sandstone	8300
Precambrian		Basement	Crystalline	9000

SAMPLE DESCRIPTION AND

CORE LOG FOR

AKZO SALT, INC

INTERNATIONAL SALT WELL # 58

READING TOWNSHIP

SCHUYLER COUNTY, N.Y.

API # 31-047-21467

PREPARED FOR:

Mr. Michael Schumacker
AKZO SALT, INC
WATKINS GLEN, N.Y.

PREPARED BY:

Brayton P. Foster

Brayton P. Foster
Consulting Geologist
Trumansburg, N.Y.

DATE: November 30, 1992

BRAYTON P. FOSTER, CONSULTING GEOLOGIST

SAMPLE DESCRIPTION AKZO SALT, INC WELL #58

Sample study of drill cutting samples 260' to 2130'

260 - 280	SANDSTONE, medium gray, fine grained, moderately calcareous, silty graywacke
280 - 320	SILTSTONE, medium gray, moderately calcareous with sand size black shale and rock fragments
320 - 360	SILTSTONE, slightly calcareous with 20% dark gray shaly siltstone. tr. pyrite
360 - 390	as above with 20% fine grained medium gray, moderately calcareous graywacke sandstone
390 - 410	SILTSTONE, medium gray moderately calcareous, shaly 30% medium gray, moderately calcareous shale
410 - 420	as above with 5% pyrite
420 - 440	SILTSTONE and medium gray shale as above, no pyrite 10% black noncalcareous shale
440 - 450	as above with 5% pyrite, 10% light gray calcareous sandy siltstone
450 - 470	Siltstones and medium gray shale as above, carbonate content increasing, scattered pyrite 20% light gray calcareous sandy siltstone
470 - 480	SHALE, dark brownish gray, calcareous 10% shaly medium gray, calcareous siltstone
480 - 490	LIMESTONE, gray brown, shaly, 40% dark gray calcareous shale
490 - 500	LIMESTONES, medium gray and brownish gray, shaly 25% dark gray calcareous shale
500 - 520	SHALE, dark gray, moderately calcareous 40% black slightly calcareous shale
520 - 650	SHALES, very dark gray to black, slightly calcareous 10% medium gray shaly limestone, tr. pyrite
650 - 660	SHALE, medium gray. moderately calcareous 40% Limestone, gray brown, aphanitic tr. fossils, tr. pyrite
660 - 690	LIMESTONE, gray brown aphanitic 40% moderately calcareous, medium gray shale
690 - 710	as above, with 20% dark gray, slightly calcareous shale. tr pyrite
710 - 730	50% LIMESTONE, brownish gray, aphanitic 40% dark gray, slightly calcareous shale 10% medium gray, moderately calcareous shale
730 - 740	50% limestone as above, 40% medium gray shale 10% dark gray slightly calcareous shale

BRAYTON P. FOSTER, CONSULTING GEOLOGIST

740 - 780	50% limestone, brownish gray, aphanitic 40% dark gray slightly calcareous shale 10% medium gray moderately calcareous shale
780 - 800	as above, tr pyrite
800 - 870	as above, moderately calcareous, tr. pyrite
870 - 900	as above, 10% medium gray shaly limestone
900 - 910	SHALE, medium gray, calcareous
910 - 920	as above, with 10% crystalline fossiliferous limestone
920 - 930	as above, without the limestone
930 - 940	SHALE, medium to dark gray, calcareous
940 - 960	as above, with 25% medium gray aphanitic limestone scattered pyrite
960 - 1000	SHALE, dark gray, calcareous, tr pyrite
1000 - 1030	Gap, no samples
1030 - 1060	SHALE, medium gray to dark gray, calcareous, tr pyrite
1060 - 1240	shale as above, moderately calcareous
1240 - 1300	SHALE, dark gray to black, calcareous
1300 - 1360	SHALE, dark gray, calcareous, slightly lighter color than above
1360 - 1370	as above, 20% medium gray, aphanitic limestone
1370 - 1380	SHALE, medium gray, calcareous
1380 - 1430	Shale, medium to dark gray, calcareous
1400 - 1410	Gap, no sample
1430 - 1530	shale as above, predominantly dark gray
1530 - 1590	shale dark gray as above, 10% slightly calcareous black shale
1590 - 1600	shale, dark gray as above, calcareous
1600 - 1620	SHALE, black, noncalcareous to slightly calcareous 10% dark gray calcareous shale as above tr. fossil shell fragment
1620 - 1640	shale as above, scattered pyrite 25% light gray crystalline limestone
1640 - 1660	shale as above becoming moderately calcareous 25% light gray crystalline limestone
1660 - 1670	SHALE, black, calcareous 5% light gray crystalline limestone as above
1670 - 1700	poor samples - black calcareous shale
1700 - 1740	poor samples - shaly medium gray aphanitic limestone - sample mostly pipe scale and cement
1740 - 1760	LIMESTONE, medium gray aphanitic 10% light gray, aphanitic limestone tr. brachiopod shell fossil

1760 - 1770	LIMESTONE, medium gray as above, several fragments of white calcite fracture filling
1770 - 1800	Gap, no samples
1800 - 1840	Limestone medium gray as above 10% light gray crystalline limestone 10% white fine grained limestone several pieces of slickensides
1840 - 1860	Limestones as above, no slickensides
1860 - 1890	DOLOSTONE, light gray calcareous 10% medium to dark gray aphanitic limestone as above Tr. pyrite
1890 - 1900	LIMESTONE, light gray, aphanitic 30% dark gray aphanitic limestone, Tr pyrite
1900 - 1920	LIMESTONE, dolomitic, dark gray 40% light gray aphanitic limestone as above Tr. fossil shell fragments
1920 - 1930	LIMESTONE, dark gray, aphanitic 10% white fine grained limestone slickensides and white calcite fracture fillings scattered white anhydrite
1930 - 1940	Limestone. dark gray, aphanitic, as above 10% medium gray aphanitic, limestone 5% white to clear anhydrite
1940 - 1970	as above, slickensides
1970 - 2000	DOLOSTONE, light to medium gray, aphanitic 10% light gray aphanitic limestone Scattered white anhydrite
2000 - 2010	Gap, no sample
2010 - 2020	Dolostone, light to medium gray, as above scattered white anhydrite 10% white crystalline limestone
2020 - 2060	DOLOSTONE, medium gray, aphanitic 30% light gray, crystalline dolostone gray mottling - fossils or bioturbation scattered white anhydrite
2060 - 2100	Dolostone, medium gray, as above 10% dark gray aphanitic dolostone scattered white anhydrite
2100 - 2120	Gap, no samples
2120 - 2130	SHALE, medium gray, dolomitic

2132 Top of cored interval

CORE DESCRIPTION AKZO SALT, INC WELL #58

GENERAL COMMENTS

While the salt in the 4" core from this well initially appears black it is generally medium to dark gray when broken with crystal size varying from 1/8" to more than 1" in length. By visual inspection inclusions and impurities appear to be generally less than 1% by volume. When struck by a hammer to break the salt core the impact area of the core appears white. The scattered small shale and dolomitic shale inclusions in the salt are angular and appear jagged with abuting salt crystals frequently imbedded in these inclusions.

Larger shale fragments that are described as suspended or floating in the salt have been broken away from their original depositional positions and moved(direction unknown) in the salt at some previous time when the salt behaved in a fluidized manner. This author believes this occurred during the Paleozoic Appalachian thrust faulting episodes although other interpretations are possible.

Other than the small discontinuous crystal lined vugs noted no primary porosity was observed in the core. All of the faults, fractures and brecciated zones observed appear sealed with shale and/or salt such that as long as frack pressure is not reached there is no evidence to suggest they will be permeable to gas or salt water.

BRAYTON P. FOSTER, CONSULTING GEOLOGIST

CORE DESCRIPTION   AKZO SALT, INC WELL #58

Core Interval 2132 - 2630.9'

2132.0 - 2138.0	SHALE, dark gray, silty, noncalcareous, scattered quarts sand grains, anhydrite nodules No recognizable fossils or worm borings Thin wavy white calcite and anhydrite vein fillings
2136 - 2137	Calcite veinlets have discontinuous open calcite crystal lined vugs(1/8" openings), thin wavy bedding defined by paper thin black shale partings, formation is massive - not easily broken
2138.0 - 2143.5	SHALE, dark gray, silty, noncalcareous as above with dolomitic light gray thin wavy veinlets and small anhydrite nodules
2143.3	½" thick horizontal vein of dolomite and anhydrite with dolomite and selenite lined vugs
2143.5	¼" horizontal vuggy dolomite and anhydrite vein as above
2143.5 - 2147.6	SHALE, dark gray, dolomitic. Thin discontinuous beds of varying dolomitic content - beds broken, distorted and sheared by soft sediment deformation Thin salt filled vugs and veinlets. Vertical salt filled desiccation cracks 1"-2" long Bedding 1/8" to paper thin
2145	Discontinuous horizontal white dolomite and anhydrite vein.
2147.2	3/4" light gray, horizontal Dolomite and anhydrite vein with dolomite and selenite crystal lined discontinuous vugs Formation fractured by both soft sediment deformation and tectonic fractures(45° most prominent) which offset bedding. Fracture openings(< 1/8") are salt filled.
2147.6 - 2149.2	SHALE, Dolomitic as above with increase in white anhydrite nodules
2148.7	40° inclined fracture with slickensides parallel with dip of fracture surface
2149.2 - 2155	SHALE, Dolomitic as above, bioturbated and brecciated. Fractures inclined 1° to 20° are salt filled and irregular.
2155 - 2157	Transition to dark gray salt with disseminated dark gray shaley dolomite fragments. Some fragments appear to be discontinuous relics of bedding
2157.0 - 2165	SALT, dark gray, medium crystalline, massive Scattered dolomitic shale inclusions which decrease with depth to less than 1 small fragment per foot below 2159'

2165.0 - 2167.3	DOLOSTONE, medium gray, shaly, brecciated with numerous salt filled fractures up to 1" thick. Soft sediment deformation of thin beds
2167.3 - 2167.5	SALT, medium gray, crystalline
2167.5 - 2192.0	GAP, core not recovered due to undersaturation of drilling brine - suggests this interval is predominately salt
2192.0 - 2224.0	SALT, medium to dark gray crystalline, with disseminated fine black shale and shaley dolostone fragments. Fragments vary in width up to 4"
2198.0 - 2198.5	Shaly dolostone interbed, brecciated with salt filled fractures
2199.0 - 2199.2	White salt vein, horizontal
2211.0 - 2211.1	White salt vein, horizontal
2219.5 - 2220.4	Large dolomitic shale fragment in half of core
2224.0 - 2227.5	SALT, lighter gray, with scattered ¼" thick horizontal white anhydrite veins
2227.5 - 2230	SHALE, dolomitic dark gray, with imbedded salt crystals, brecciated with salt filled fractures Bedding ranges from black shale partings to 1" thick DIP 10°
2230 - 2232.4	SHALE, dark gray, dolomitic, lacks salt crystals observed in overlying shale
2232.4 - 2234	SALT, medium gray, with brecciated shale interbeds
2234 - 2252.0	SALT, medium gray crystalline, with scattered small black shale flakes and occasional dolomitic shale fragments.
2240.6 - 2241.1	Large dolomitic shale fragment, faint slickensides at base
2249.-	Increase in dark shale fragments below 2249'
2252	White salt vein, horizontal, large crystals
2252.0 - 2320.1	SALT, gray to dark gray, crystalline with suspended angular dolostone fragments up to 2" in diameter
2263.5 -	¼" to ½" thick coarse crystalline light gray to clear salt vein, DIP 10° with slickensides at right angles to dip
2265.5 - 2266.7	DOLOSTONE, medium gray, brecciated with salt filling vertical fractures and fractures parallel with bedding
2266 -	40° inclined 3/4" thick slickensided fracture filled with salt. Bounded by paper thin noncalcareous black shale(gouge). Slickenside direction 20° from dip direction
2270 - 2280	Several 2" to 3" shale fragment inclusions in salt

2275.9 - 2276.6	Suspended dolomitic shale fragment
2280 - 2281	50% black shale fragments suspended in salt ½" of white coarse crystalline salt adjoins shale fragments
2320.1 - 2322.9	SHALE, very dark gray, noncalcareous, brecciated with salt filled fractures. Bedding vertical - 90° dip suggests this is large block suspended in salt
2322.9 - 2326.0	SALT, dark gray
2326.0 - 2332.8	SHALE, dark gray dolomitic, brecciated with salt crystals and salt filled fractures DIP 25°
2332.8 - 2333.5	SHALE - "CLAY SEAM", noncalcareous soft, dark gray brecciated with thin white salt filled fractures
2333.5 - 2350.1	SHALE, dolomitic, medium to dark gray, thin bedded (1/8" to 1" thick beds) with salt inclusions and thin black shale and salt interbeds 20° DIP Mildly brecciated - some fracturing of beds and uneven slickensides on bedding surfaces Thin salt filled fractures both horizontal and vertical
2336.9	Slickensides on bedding parallel to dip direction with 1/8" of black shale gouge on each side
2339	Slickensides both vertical and horizontal with vertical and horizontal thin salt filled fractures
2343	Brecciation intensity increases downward Vertical and horizontal fractures are paper thin salt layers - several are slickensided 20° DIP
2347.0 - 2348.0	¼" vertical salt filled fracture
2350.1 - 2355.9	SHALE, dark gray and black, soft, noncalcareous, Predominantly thin bedded with beds crenulated and sheared by soft sediment deformation salt inclusions and paper thin black salt interbeds. Slickensides on some salt-black shale bedding interfaces 20° DIP
2352.4	1/8" white salt vein filling parallel with bedding
2354.0 - 2355.9	Shale is very soft - "clay like" crumbles easily
2355.9 - 2357.2	SALT, black with brecciated dark gray noncalcareous shale
2357.2 - 2358.6	SHALE, dark gray to black, soft, noncalcareous, with thin salt filled fractures and salt crystal inclusions
2358.6 - 2360.6	SALT, dark gray with soft black noncalcareous shale fragment inclusions

CORE DESCRIPTION AKZO SALT, INC WELL #58 Page 4

2360.6 - 2363.5	SHALE, dark gray, thin bedded, soft noncalcareous, brecciated with salt crystal inclusions and salt filled fractures
2361	Steeply inclined 1" thick white salt vein Several horizontal slickensides in this interval Salt content increasing downward Gradational contact with underlying salt
2363.5 - 2386.6	SALT, dark gray with small noncalcareous black shale inclusions, Occasional 2" diameter fragment of black noncalcareous or gray noncalcareous shales - all with angular edges
2386.6 - 2386.8	White to light gray coarse crystalline salt vein
2386.8 - 2388.8	50% brecciated soft black noncalcareous shale with 50% dark gray salt crystals "dumped" together - no bedding or layering
2388.8 - 2409.0	SALT, gradational top contact, black with soft black noncalcareous shale fragments(up to 1"in diameter) scattered in salt matrix
2393 - 2394	Zone rich in black shale inclusions up to 4" in diameter
2406 - 2409.0	Zone of approximately 25% soft black, noncalcareous shale fragments
2409.0 - 2413.9	SHALE, black, soft, noncalcareous, Strongly brecciated with salt filled fractures and salt inclusions
2410.3	Fracture with 45° dip, with slickensides at 45° angle to dip of bedding
2411 - 2413	DIP increses to 90° Beds are shattered, contorted and tightly folded. 1" beds plasticly folded and overturned in a small ½' high "Z" fold Folds intruded with thin white salt vein and fracture fillings
2413.9 - 2414.9	SALT, clear, coarse crystalline Sharp angular contact with overlying brecciated shale. Basal contact horizontal with slickensides
2414.9 - 2424.6	SHALE, black, thin bedded, soft, noncalcareous with salt inclusions, paper thin salt veins parallel and perpendicular with bedding 5° DIP
2418.5	½" vertical white salt fracture filling
2420.8	Horizontal ¼" white salt fracture filling Becoming brecciated downward with ¼" to 1" thick white salt vertical fracture fillings Slickensides parallel bedding 4° DIP

2424.6 - 2427.9	DOLOSTONE, dark gray, salty with 2½' high stromatoporoid head
2427.9 - 2442.0	SHALE, dark gray to black, soft, noncalcareous thin bedded 20° dip Slickensides with several different orientations on bedding planes Occasional thin white salt veins parallel bedding Small depositional cut and fill channels in individual ¼" dark gray shale layers
2439	Brecciation below shearing and mild folding of thin ¼" thick beds thin white salt fracture fillings
2442.0 - 2446.8	SALT, clear, massive crystalline crumbles out of core barrel
2446.8 - 2447.3	Inclined brecciated black shale fragment
2447.3 - 2462.3	SALT, dark gray to black with occasional black shale fragments up to 3" in diameter Salt is massive but when struck with hammer breaks at 20° angle from horizontal
2462.3 - 2463.6	SALT, white, coarse crystalline
2463.6 - 2469.2	SHALE, black, soft, noncalcareous brecciated with horizontal and vertical slickensides Thin white salt fracture fillings - both horizontal and vertical 20° DIP Slickensides on bedding oriented at several different directions relative to dip
2469.2 - 2473.0	SHALE, dark gray to black, calcareous, thin bedded. Bedding is wavy and broken by fracturing, with salt blebs and thin salt filled fractures
2473.0 - 2473.9	as above, softer with less carbonate content 30° dip
2473.9 - 2480.5	Dolostone, medium gray shaly with thin(1/8") salt filled fractures Lower 2' with soft black slightly calcareous shale interbeds Slickensides on bedding planes oriented at 20° to dip direction
2480.5 - 2481.0	SALT, white coarse crystalline Horizontal slickenside surface at top of salt
2481.0 - 2492.5	DOLOSTONE, dark gray, shaly brecciated and shattered with white salt filled fractures Bedding nearly vertical Calcareous content increases below 2485'

	Some of this steep bedding may be drape around a stromatoporoid mound
	Dip decreases to 45° at 2491' with increasing black calcareous shale content
2492.5 - 2495.0	DOLOSTONE, medium gray, coarser beds(½" to 2+" thickness) than above
	Fractured with thin salt filled fractures
2495.0 - 2504.0	SHALE, dark gray to black, slightly dolomitic soft 10° DIP
2496.2	¼" vertical gray salt filled fracture terminates at ¼" gray salt vein paralleling bedding
2501	Dolomitic content increasing below 2501'
2504.0 - 2525.9	SALT, dark gray with angular suspended fragments of overlying dolomitic shale
	Gradational contact at top
2512.1 - 2513.2	Fractured dark gray slightly dolomitic shale fragment zone. Largest pieces of this shale exceed core width
2517 - 2519	Zone of increased concentration of slightly dolomitic dark gray shale fragments
2525.9 - 2537.0	SALT, light gray to white, coarse crystalline with a few black shale inclusions
2537.0 - 2542.0	SHALE, medium gray, dolomitic, thin bedded with salt filled fractures both vertical and parallel with bedding 10° DIP
	some beds have salt crystal inclusions
2542.0	Increase in dolomitic content below
2544.9	White salt filled vertical vein(½" wide) suggestive of mud crack filling
2546.9 - 2551.8	SALT, medium to light gray, coarse crystalline with few small shale inclusions
	Sharp contacts
2551.8 - 2552.3	SHALE, medium to dark gray, fractured in salt matrix
2552.3 - 2575.8	SALT, medium to dark gray, with few small black shale inclusions
2568.2	2" horizontal vein of white coarse crystalline salt
2569 - 2570	Zone of 25% dark shale fragments
2575.8 - 2576.0	Horizontal vein of coarse crystalline white salt

2576.0 - 2626.5	SALT, medium gray to light gray with small black noncalcareous shale inclusions
2580	Salt slightly darker gray below 2580'
2586	Below 2586 increase in large fragments of thin bedded shaly gray dolostones
2605.7 - 2606.0	Horizontal vein of white coarse crystalline salt
2609.0 - 2609.3	Horizontal vein of white coarse crystalline salt
2609.3 - 2618.3	Salt as above, with increase in dolomitic shale inclusions, scattered dark gray shale fragments
2622.7 - 2623.0	Horizontal vein of light gray coarse crystalline salt
2626.5 - 2630.9 Core TD	DOLOSTONE, medium to light gray, shaly, thin bedded with black shale partings. Bedding varies from horizontal to severely brecciated. Fractures both horizontal and vertical are filled wth gray salt.

7. Deadweight pressure gauges or electronic pressure transducer systems may be used to record pressure changes. Pressure measuring devices must have a certified minimum sensitivity of 0.1 psi.

8. Wellhead pressures for the reference well and the test well must be read simultaneously. If a deadweight pressure gauge is used then at least 10 readings should be taken every two hours.

9. The maximum test period shall be 8 hours. The average hourly pressure change should be calculated based upon a continuous 8 hour test period. Averaging results from test periods greater than 8- hours may be authorized only by the Director.

B. Determination

The Water-Brine Interface Method, subject to the conditions and procedures discussed in this notice, provides the necessary information to demonstrate reliably whether a well has a leak in the casing or tubing. EPA is approving the test for Class III salt solution mining injection wells in all States.

Dated: January 2, 1992.

James R. Elder,

Director, Office of Ground Water and Drinking Water.

[FR Doc. 92-664 Filed 1-9-92; 8:45 am]

BILLING CODE 6560-50-M

D Maps and Cross Sections of USDWs

The area of review is situated on the slope of a steep-sided glacial valley, extending from the shoreline of Seneca Lake up to an elevation 600 feet above the lake level. The near-surface geology of the AOR is characterized by low-permeability shales with extensive outcrops overlain by thin glacial till. According to the public report "Ground-Water Resources of the Western Oswego River Basin, New York", USGS ORB-5 1974, these bedrock shales have predominantly low permeability and will not provide adequate capacity for a public groundwater supply. Groundwater flow is eastward, downgradient to Seneca Lake, so that injection activities cannot affect the few shallow residential wells in the area.

Water wells in the AOR that are listed in the Schuyler County records are located on Drawing D-3. All of these wells are shallow, and are completed into the surficial till or into the top of the shale bedrock. The Broome water well, designated no. 422513N0765412.1 on the referenced USGS report, has been utilized by Akzo Nobel for the last nine years as a groundwater monitoring well under their existing UIC permit, as described in section P, and is located on Drawing B-1. Recent chemical analysis of the water taken from this well is shown in Table H-1.

No public groundwater supplies are found in the AOR. The closest public water supply utilizing groundwater is in the village of Montour Falls, which has shallow wells completed into the glacial gravels in the base of Catherine Creek valley, approximately 4 miles south of the AOR. The public water supply source for the Village of Watkins Glen is Seneca Lake.

Drawing D-1, taken from the referenced USGS report, shows the individual aquifers and water well yields in the general area. Drawing D-2, from the same source, shows maximum aquifer yields in the area.

Q Plugging and Abandonment Plan

When a well depletes its available reserves or experiences a mechanical failure, it will be permanently plugged and abandoned in accordance with the current USEPA Region II and New York Department of Environmental Conservation (NYDEC) guidelines.

A notice of intent to plug and abandon will be provided to the NYDEC and a plugging permit issued before any work begins. A typical well plugging plan is given in the attached form 7520-14; well-specific procedures will be provided to the NYDEC for each well as it is proposed to be plugged.

Most wells in this field were originally equipped with a production casing placed and cemented to a depth well below the top of the salt beds. As salt is removed by mining, rock liberated from the cavern roof will commonly damage the casing severely enough to prevent passage of large tools,such as bridge plugs, or will often break it off completely. Since the well annuli are all cemented to surface, this casing failure does not cause a loss of mechanical integrity or a danger to ground water. When a well is to be plugged, any tubing is removed and a wireline caliper log or a gauge ring is run to determine the greatest depth at which a cast iron bridge plug can be set. A plug is set at this point, and the casing is completely filled above that point with class 'A' cement. Cement is typically placed through a workstring in three stages using the balance method. After the cement has cured, any fallback is replaced by concrete, the casings are cut off three feet below the surface, a plate is welded over them, and the hole is backfilled to grade.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

EPA

PLUGGING AND ABANDONMENT PLAN

NYD 002246361

WELL NAME & NUMBER, FIELD NAME, LEASE NAME & NUMBER	NAME, ADDRESS, & PHONE NUMBER OF OWNER/OPERATOR
Typical Well International Brinefield	Akzo Nobel Salt Inc. Salt Point Rd. Watkins Glen, NY 14891

Locate Well And Outline Unit On Section Plat — 640 Acres

N / W / E / S

STATE	COUNTY	STATE PERMIT NUMBER
NY	Schuyler	

SURFACE LOCATION DESCRIPTION

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

Surface Location ______ ft. From (N/S) ______ Line Of Quarter Section

And ______ ft. From (E/W) ______ Line Of Quarter Section

TYPE OF AUTHORIZATION

- ☐ Individual Permit
- ☐ Rule
- ☒ Area Permit

Number of Wells In Area Permit 20

U.S.EPA Permit Number ______

WELL ACTIVITY

- ☐ Class I
  - ☐ Hazardous
  - ☐ Nonhazardous
- ☐ Class II
  - ☐ Brine Disposal
  - ☐ Enhanced Recovery
  - ☐ Hydrocarbon Storage
- ☒ Class III
- ☐ Class V

CASING/TUBING/CEMENT RECORD AFTER PLUGGING AND ABANDONMENT

Size	Wt (lb/ft) TBG/CSG	Original Amount (CSG) (ft.)	CSG to be Left in Well (ft.)	Hole Size (in.)	Sacks Cement Used	Type
14"		80	80	17-1/2	Cement to Surface	
8-5/8"	36	2700	2100	12-1/4	Cement to Surface	

METHOD OF EMPLACEMENT OF CEMENT PLUGS

- ☒ The Balance Method
- ☐ The Dump Bailer Method
- ☐ The Two Plug Method
- ☐ Other, Explain:

CEMENT TO PLUG AND ABANDON DATA:	Plug # 1	Plug # 2	Plug # 3	Plug #	Plug #	Plug #	Plug #
Size of Hole or Pipe in Which Plug Will Be Placed (inches)	8-5/8	8-5/8	8-5/8				
Calculated Top of Plug (ft.)	1000	200.	Surf				
Measured Top of Plug (ft.)							
Depth to Bottom of Plug (ft.)	2100	1000	200				
Sacks of Cement to be Used	311	226	57				
Slurry Volume to be Used (cu. ft.)	367	267	67				
Slurry Weight (lb./gal.)	15.6	15.6	15.6				
Type of Cement, Spacer or Other Material Used	Class A	ClassA	ClassA				
Type of Preflush Usd	Water	Water	Water				

DESCRIPTION OF PLUGGING PROCEDURE

Place a cast iron bridge plug as deeply as possible in the production casing. Place Class 'A' cement from the bridge plug to surface in three stages. Cut the casing off three feet below ground surface, weld a plate over it, and backfill to grade.

ESTIMATED COST OF PLUGGING AND ABANDONMENT

Cement	$ 10,000	Cast Iron Bridge Plug	$ 3,000
Logging	$ 2,000	Cement Retainer	$
Rig or Pulling Unit	$ 8,000	Miscellaneous	$ 4,000

CERTIFICATION

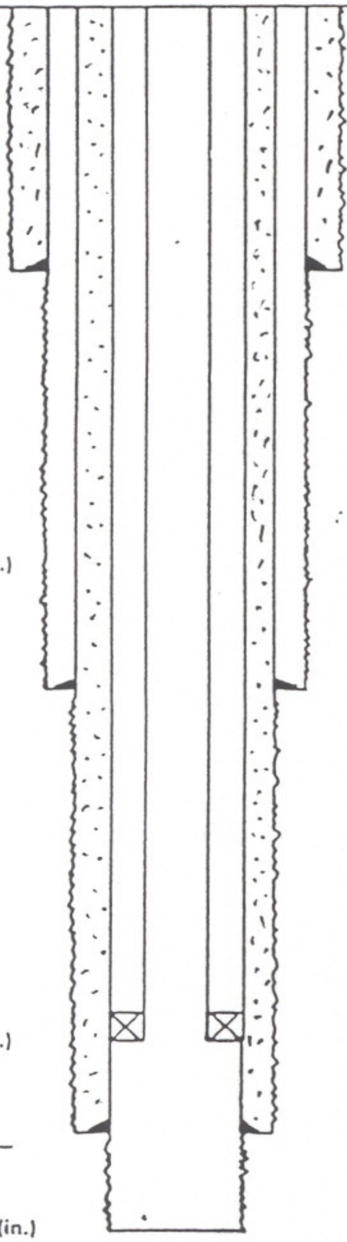
I certify under the penalty of law that I have examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref.40 CFR 144.32)

NAME AND OFFICIAL TITLE (*Please type or print*)	SIGNATURE	DATE SIGNED
Michael J. Schumacher Manager-Solution Mining Tech.	MJ Schumacher	Jan 26, 1995

NYD 002246361

ORIGINAL WELL CONSTRUCTION DURING OPERATION

Surface



Top Of Cement 0 (ft.)

Surface Casing 80 (ft.)

USDW Base ____ (ft.)

Top Of Cement ____ (ft.)

* Intermediate Casing ____ (ft.)

Packer Depth N/A (ft.)

Top Of Cement 0 (ft.)

Long String Casing 2100 (ft.)

Perforations: ____

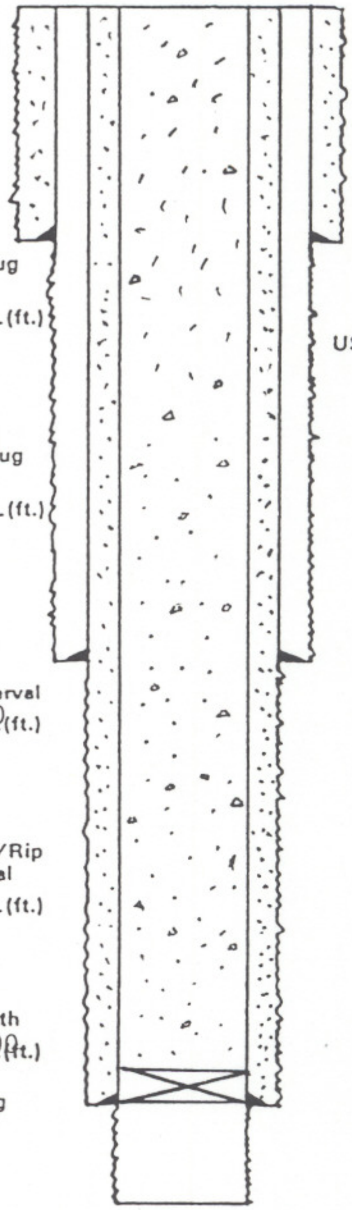
Hole Size 12¼ (in.)

* Depth 2750 (ft.)

** Add Any Additional Information
* May Not Apply

PLUGGING AND ABANDONMENT CONSTRUCTION

Surface



Top Plug Interval
0 (ft.) to
200 (ft.)

Surface Casing 80 (ft.)

* USDW Base Plug Interval
____ (ft.) to ____ (ft.)

USDW Base ____ (ft.)

* Intermediate Cut/Rip Point Plug Interval
____ (ft.) to ____ (ft.)

* Intermediate Cut/Rip Depth ____ (ft.)

* Intermediate Casing ____ (ft.)

* Middle Plug Interval
200 (ft.) to 1000 (ft.)

* Long String Cut/Rip Point Plug Interval
____ (ft.) to ____ (ft.)

* Long String Cut/Rip Depth
____ (ft.)

Bottom Plug Depth
1000 (ft.) to 2100 (ft.)

* Mechanical Plug Depth 2100 (ft.)

Long String Casing 2100 (ft.)

* Depth – (ft.)

** Add Any Additional Information
* May Not Apply

LIST OF ALL OPEN AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED

Specify Open Hole/Perforations/Varied Casing	From	To	Formation Name

R Necessary Resources

Francis E Crowley
Senior Vice President
Chief Financial Officer

AKZO NOBEL

November 28, 1994

Richard Caspe, Director
Water Management Division
USEPA
Region II
Jacob K. Javits Federal Bldg.
New York, NY 10278-0012

Dear Mr. Caspe:

I am the Chief Financial Officer of Akzo Nobel Salt Inc. This letter is in support of this firm's use of the financial test to demonstrate financial assurance, as specified in Subpart F of 40 CRF Part 144.

1. This firm is the owner or operator of the following injection wells for which financial assurance for plugging and abandonment is demonstrated through the financial test specified in Subpart F of 40 CFR Part 144. The current plugging and abandonment cost estimate covered by the test is shown for each injection well: 20 wells at Watkins Glen at $27,000 per well.

2. This firm guarantees, through the corporate guarantee specified in Subpart F of 40 CFR Part 144, the plugging and abandonment of the following injection wells owned or operated by subsidiaries of this firm. The current cost estimate for plugging and abandonment so guaranteed is shown for each injection well: None.

3. In States where EPA is not administering the financial requirements of Subpart F of 40 CFR 144, this firm, as owner or operator or guarantor, is demonstrating financial assurance for the plugging and abandonment of the following injection wells through the use of a test equivalent or substantially equivalent to the financial test specified in Subpart F or 40 CFR 144. The current plugging and abandonment cost estimate covered by such a test is shown for each injection well: None.

4. This firm is the owner or operator of the following injection wells for which financial assurance for plugging and abandonment is not demonstrated either to EPA of a State through the financial test or any other financial assurance specified in Subpart F of 40 CFR 144 or equivalent or substantially equivalent State

Akzo Nobel Salt Inc.
Abington
Executive Park
P O Box 352
Clarks Summit,
Pennsylvania
18411-0352
Phone:
717/587-9300
Fax:
717/586-7426

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mechanisms. The current plugging and abandonment cost estimate not covered by such financial assurance is shown for each injection well: None.

This firm is not required to file a Form 10K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this firm ends on December 31. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements for the latest completed fiscal year, ended 1993.

1. (a) Current plugging and abandonment cost..$540,000
   (b) Sum of the company's financial responsibilities under 40 CFR 264 and 265, Subpart H, currently met using the financial test or corporate guarantee..$1,475,000
   (c) Total of lines a and b...$2,015,000

*2. Total liabilities (if any portion of the plugging and abandonment cost is included in total liabilities, you may deduct the amount of that portion from this line and add that amount to lines 3 and 4)...$216,924,000

(A)

*3. Tangible net worth..$ 89,857,000
*4. Net worth...$ 89,857,000
*5. Current assets...$167,293,000
*6. Current liabilities..$ 38,534,000
*7. Net working capital (line 5 minus line 6)......................................$128,759,000
*8. The sum of net income plus depreciation, depletion and amortization...$ 35,011,000
*9. Total assets in U.S. (required only if less than 90% of firm's assets are located in U.S...N/A

	YES	NO
10. Is line 3 at least $10 million?	X	
11. Is line 3 at least 6 times line 1 (c)?	X	
12. Is line 7 at least 6 times line 1 (c)?	X	

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	YES	NO
*13. Are at least 90% of firm's assets located in the U.S.? If not, complete line 14	X	
14. Is line 9 at least 6 times line 1 1c)?		
15. Is line 2 divided by line 4 less than 2.0?		X
16. Is line 8 divided by line 2 greater than 0.1?	X	
17. Is line 5 divided by line 6 greater than 1.5?	X	

(A) Included $169,700,000 payable to Parent Akzo Nobel Inc.

I hereby certify that the wording of this letter is identical to the wording specified in 40 CFR 144.70(f) as such regulations were constituted on the date shown immediately below.

Francis E. Crowley
Sr. Vice President & CFO

FEC/drf

T Existing EPA Permits

Three USEPA permits are currently in force at the Watkins Glen Plant, all are Underground Injection Control permits which expire in October, 1995:

UIC	NYU040398	Class V Wells
	NYU040401	Class I Wells
	NYU063860	Class III Wells

All wells permitted under NYU040398 and NYU040401 have been plugged and abandoned; the permits will be allowed to expire without renewal. This present application is for renewal or replacement of NYU063860.

The following New York Dept. of Environmental Conservation permits are in effect at the Watkins Glen plant:

Water - SPDES Discharge permit - NY0002330

Air - Certificates to operate

C 443200 0006 00018 W C
C 443200 0006 00018 W CA
C 443200 0006 00018 W CB
C 443200 0006 00018 W CC
C 443200 0006 0001A W I
C 443200 0006 00002 W I
C 443200 0006 00004 W I
C 443200 0006 00005 W I
C 443200 0006 00006 W I
C 443200 0006 00009 W I
C 443200 0006 00010 W I
C 443200 0006 00011 W I
C 443200 0006 00012 W I
C 443200 0006 00014 W I
C 443200 0006 00015 W I
C 443200 0006 00021 W I
C 443200 0006 00022 W I
C 443200 0006 00101 W R

Akzo Nobel Salt Inc. operates two brinefields in Michigan under USEPA UIC permits:

UIC	MI-147-3G-A001	St. Clair, MI
	MI-101-3G-A002	Manistee, MI

U Description of Business

Akzo Nobel Salt Inc. is engaged in the manufacturing, packaging, and marketing of salt (sodium chloride) products. It is headquartered in Clarks Summit, Pennsylvania.

Akzo Nobel Salt Inc. is a subsidiary of Akzo Nobel n. v., a major Netherlands corporation. It has previously operated as International Salt Company until 1989 and as Akzo Salt Inc. until 1994.

Akzo Nobel Salt Inc. produces salt by hard rock mining, solution mining, and by solar evaporation of sea water and water from Utah's Great Salt Lake. They have nine production facilities in the United States and the Netherlands Antilles. Solution mining facilities are located in Akron, Ohio, Manistee, Michigan, St. Clair, Michigan, and Watkins Glen, New York.

Salt products are shipped both packaged and in bulk. Bulk shipments by rail, truck, barge, and ocean-going ship are primarily for chemical use, snow and ice control, or for repackaging at a other locations. Salt is packaged for a wide variety of agricultural, chemical, food processing, water softening, pharmaceutical and grocery products. Typical products include granular salt, compression of granular salt into block, pellets, and flakes, salt mixed with vitamins and minerals, and the familiar round cans for consumer use.